Appendix E3: Presentation of Population Estimates

The historical (target) and current abundance of the delta smelt, longfin smelt and Sacramento splittail species were estimated in order to calculate the number of fish needed to restore the current population to pre-decline levels. This appendix, a supplement to Chapter E-5, describes the methodology used to estimate historical and current abundance of these T&E species.

In their 1990 report to the California Fish and Game Commission, Stevens et al. (1990) calculated the delta smelt population by using the ratio of juvenile delta smelt to young striped bass caught in the fall midwater trawl survey. This ratio was multiplied by striped bass population numbers that were derived from a life table analysis and the resulting population estimate of delta smelt is the only known attempt to approximate total delta smelt populations in the Sacramento-San Joaquin delta. Unfortunately, only 8 years of striped bass populations were presented to the Commission. Using the 8 years of available striped bass populations, EPA extrapolated longfin, delta smelt, and splittail populations through the 1990's and into 2000. This extrapolation involved:

- averaging (across the 8 years) the percentage of the total striped bass population caught in the trawling runs; and
- dividing the average percentage of the bass population caught in the trawling runs by the delta smelt, Sacramento splittail, and longfin smelt abundance indices taken from the Fall midwater trawl survey conducted annually for more than 30 years.

Tables E3-1 and E3-2 show annual population numbers derived for delta smelt, longfin smelt, and sacramento splittail using this methodology. Table E3-1 shows population estimates for the baseline 8 years from 1968 to 1985 (nonsequential years are due to trawling surveys not conducted in that specific year). Table E3-2 presents population estimates for 1990-2000 based on the average population-caught indice of 0.13% (striped bass caught versus population estimate) that was calculated across the baseline range (1968-1985).

Table E3-1: Sacramento-San Joaquin Delta Population Estimates of Striped Bass, Sacramento Splittail, Delta and Longfin Smelt (1968-1985)

Species	1968	1970	1971	1972	1975	1977	1984	1985
Striped bass[a]	1,800,000	8,100,000	11,900,000	12,700,000	1,600,000	400,000	11,800,000	4,700,000
Delta smelt	302,390	1,634,065	1,630,634	2,620,372	245,207	217,894	326,333	293,750
Longfin smelt	1,433,744	6,382,913	20,006,867	1,574,295	991,733	95,130	13,374,290	2,649,091
Splittail	7,820	24,418	22,526	26,929	1,407	0	28,689	40,057

[a] Note: Population estimates for **delta**, **longfin** and **splittail** in this table are equal to each year's ratio of striped bass caught vs. population (Stevens et al., 1990), divided by annual trawling abundance indices.

Table E3-2: Sacramento-San Joaquin Delta Population Estimates of Striped Bass, Sacramento Splittail, Delta and Longfin Smelt (1990-2000)

Species	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Striped bass[a]	1,053,199	752,627	1,630,426	1,241,356	1,003,768	385,881	312,532	452,852	975,864	431,325	310,937
Delta smelt	290,208	549,322	124,375	859,462	81,322	716,750	101,254	241,574	334,855	688,845	602,739
Longfin smelt	193,738	106,835	60,593	636,225	434,514	6,893,233	1,106,617	550,119	5,305,063	4,179,312	2,741,029
Splittail	6,378	14,351	2,392	7,973	2,392	60,593	17,540	797	224,034	31,094	6,378

[a] Note: Population estimates for **striped bass**, **delta**, **longfin** and **splittail** in this table are equal to the average of 1968-1985 population estimates developed in Table E3-1 for the striped bass caught vs. bass population ratio (0.13%) divided by the annual trawling abundance indices for the relevant species.